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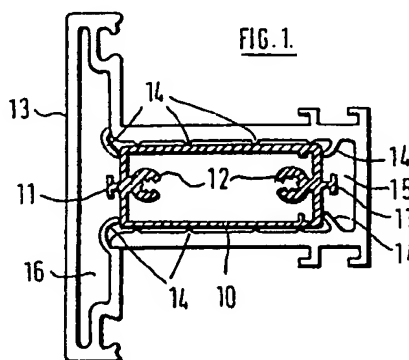
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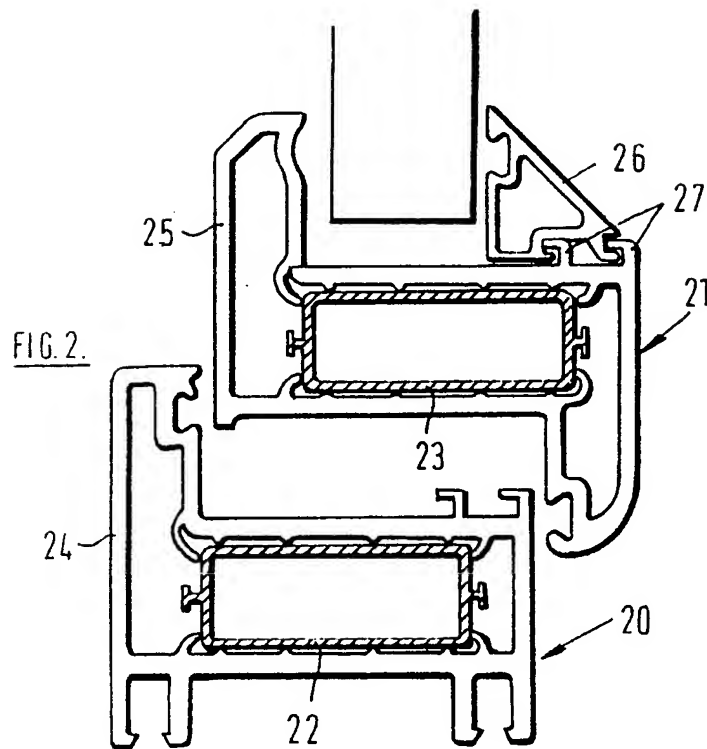
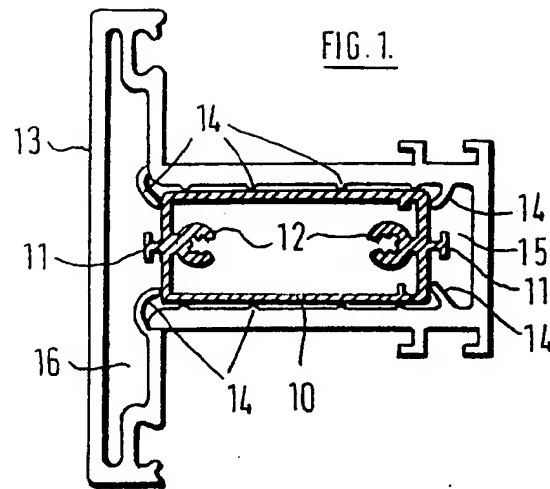
(56) Documents cited
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(58) Field of search
E1J

(54) Frame members

(57) A method of manufacturing a window or door frame member comprises assembling an elongate metal element 10 within an extruded plastics element 15, e.g. of UPVC, and filling the space 15,16 between the elements with foamed plastics material so adhesively securing them together. The foamed material is preferably a polyurethane foam. The metal element may have projections 11 to improve adhesion and the plastics element may have ribs 14 to locate the metal element.





SPECIFICATION

Window and door frame members

5 This invention relates to frame members for use in the construction of windows or doors. Frame members according to the invention, of which examples are described hereafter, may be used to form the fixed peripheral frames of windows or
10 doors, sub-frames in which windows or doors are to be installed, the frames of pivoting or sliding window sashes or doors, or fixed windows, transoms or mullions, and structures for other like architectural purposes.

15 According to one aspect of the present invention, we provide a method of manufacturing a window or door frame member, comprising providing an elongate metal element, providing an elongate extruded plastics element, placing said metal and
20 plastics elements in assembled relation with one another with said plastics element enclosing said metal element and a space defined between said elements, and introducing a foamed plastics material into said space to secure said metal and plastics elements together.

Said foamed plastics material is conveniently a polyurethane foam, which may be injected into said space in liquid form and which foams in situ completely to fill the space. There are such polyurethane foams available which adhere very well to metals and plastics, so that a secure adhesive connection is established between the metal and plastics elements of the frame member.

A frame member thus manufactured has the advantages that it presents good rigidity and dimensional stability when subjected to adverse conditions, e.g. low and high temperature climatic conditions, and a low thermal conductivity by virtue of the plastics element enclosing the metal element and the foamed plastics material
40 therebetween.

The plastics and metal elements preferably have interengaging formations which determine the position of the metal element, as viewed in cross-section within the plastics element.

The metal element may have longitudinally spaced keying formations with which the foamed plastics material engages. Such keying formations may be provided by, for example, crimping the
50 metal element at spaced intervals.

The metal element, which may be an extrusion of an aluminium alloy and preferably is of closed hollow section, may have an external surface which is so configured as to present an enlarged surface area for contact with the foamed plastics material. This improves adhesion between the metal element and the foamed material.

The invention also provides a window or door frame member made by the method of the invention.
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The invention will now be described by way of example with reference to the accompanying drawings, of which

Figure 1 is a cross-sectional view of a frame member according to the invention,

Figure 2 is a cross sectional view of part of a window structure incorporating two further examples of frame member according to the invention.

Referring firstly to *Figure 1* of the drawings, this shows a frame member which is intended to form a transom or mullion member of a window. The frame member comprises a metal element 10 which is hollow and of generally rectangular cross-section. Opposed end walls have outwardly extending T section formations 11, and inwardly extending formations 12 which in known manner are adapted to receive screws by which the frame member is secured in position in a window structure. The metal element 10 is conveniently an extrusion of an aluminium alloy.

The metal element 10 is disposed within an extruded element 13 of plastics material, e.g. U-PVC. The plastics element 13, is generally of T shape in cross-section, and has inwardly extending formations 14, which locate the metal element 10 within it. Two large spaces 15, 16 are defined between the metal element which, when the frame member is in use, will be on the interior and exterior sides of a building within which the window is installed.

The spaces 15, 16, are filled with a foamed plastics material e.g., a polyurethane foam, which is of a nature such as to adhere to the plastics and metal elements so that they are firmly secured together.

The frame member thus possesses good rigidity by virtue of the metal element, and good thermal insulation properties by virtue of the surrounding plastics element and filling of foamed plastics material.

To manufacture the frame member according to *Figure 1*, the metal and plastics elements 10, 13, would be extruded separately and assembled by introduction of the metal element longitudinally into the plastics element. Correct positioning of the metal element within the plastics element is ensured by virtue of formations 14 in the plastics element. Thereafter, the polyurethane foam would be introduced into spaces 15, 16, by injecting the appropriate material into the spaces in liquid form whereafter it foams in situ, completely to fill spaces 15, 16 and establish a secure adhesive connection between the metal and plastics elements. Polyurethane foams tend to adhere well to plastics such as U-PVC, and adhesion to the metal elements is improved by the presence of formations 11 thereon. In addition, the external surfaces of the metal element which are to contact the foamed material may be, for example, serrated to provide an increased surface area of contact with the foamed material.

Referring now to *Figure 2* of the drawings, this shows in cross-section part of a window structure incorporating a fixed peripheral frame 20 and a pivotally opening sash 21. The frame member for both of these components comprises a metal element within a plastics element, and foam fill d spaces, analogous to the frame member shown in *Figure 1*. It will be noted that the metal elements 22, 23, of the fixed frame and sash frame are identical in cross-section to one another, while the

plastics elements 24, 25 are different. Thus, manufacture of frame members according to the invention is economical since a common metal element is used and only different plastics elements need
5 be extruded. For the sash frame elements 21, engagement of a glazing bead 26 with formations 27 on the plastics element 25 is illustrated.

In the examples described above, the filling of foamed plastics material is provided in only the
10 two major spaces on opposite sides of the metal element of the frame member. The probability is that the foamed material will not penetrate the narrow spaces provided between formations 14, of the plastics element and the metal element. However,
15 it is not detrimental if the foam does thus penetrate, and indeed the configuration of the metal and plastics elements may be arranged so that in the finished frame member the metal element is substantially completely surrounded by the foamed
20 plastics material. If desired, e.g. for reasons of strength or rigidity, a plurality of spaces or cavities may be provided in the cross-section of the frame member, some or all of which may be filled with the foamed material.

25 To increase lengthways security of the metal element within the plastics element, the former may be provided with longitudinally spaced keying formations which the foamed material engages. Such formations may be provided, for example by passing
30 the metal element through rollers which crimp it at spaced intervals along its length. As an alternative to the use of an extruded metal element the metal element may be a rolled section.

35 CLAIMS

1. A method of manufacturing a window or door frame member, comprising providing an elongate metal element, providing an elongate extruded plastics element, placing said metal and
40 plastics elements in assembled relation with one another with said plastics element enclosing said metal element and a space defined between said elements, and introducing a foamed plastics material into said space to secure said metal and plastics
45 elements together.

2. A method according to claim 1 wherein said plastics material is injected in liquid form into said space and foams in situ.

50 3. A method according to claim 1 or claim 2 wherein said foamed material is a polyurethane foam.

4. A window or door frame member made by the method of any one of claims 1 to 3 and comprising an elongate metal element, an extruded
55 element of a plastics material enclosing said metal element, and a filling of a foamed plastics material occupying a space between said metal and plastics elements, said foamed material establishing an adhesive connection between said metal and plastics
60 elements.

5. A frame member according to claim 4 wherein said plastics and metal elements have inter-engaging formations which determine the position
65 of the metal element within said plastics

element.

6. A frame member according to claim 4 or claim 5 wherein said metal has longitudinally spaced keying formations with which said foam
70 engages.

7. A frame member according to any one of claims 4 to 6 wherein said metal element comprises an extrusion of an aluminium alloy.

8. A frame member according to any one of claims 4 to 7 wherein said metal element is a
75 closed hollow section.

9. A frame member according to any one of claims 4 to 8 wherein said plastics element is of U-PVC.

80 10. A frame member according to any one of claims 4 to 9 comprising a plurality of spaces, at least some of which contain said foamed material.

11. A window or door frame member, substantially as hereinbefore described with reference to the accompanying drawings.

85 12. A method of manufacturing a window or door frame member, substantially as hereinbefore described.

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